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L1: Entry 1 of 2

File: JPAB

Apr 19, 1994

PUB-NO: JP406106916A  
DOCUMENT-IDENTIFIER: JP 06106916 A  
TITLE: PNEUMATIC TIRE

PUBN-DATE: April 19, 1994

## INVENTOR-INFORMATION:

NAME

COUNTRY

NAKAGAWA, MASAO

## ASSIGNEE-INFORMATION:

NAME

COUNTRY

BRIDGESTONE CORP

APPL-NO: JP04261789

APPL-DATE: September 30, 1992

US-CL-CURRENT: 152/209.12

INT-CL (IPC): B60C 11/04; B60C 11/11

## ABSTRACT:

PURPOSE: To provide a pneumatic tire wherein generation of a hydroplaning phenomenon is suppressed to concurrently reduce also generation of a noise.

CONSTITUTION: In a tire 1, a pair of side walls and a tread part 2 astride between both the side walls are toroidally connected. The tread part 2 is formed by providing a main peripheral groove 5 and a subperipheral groove 6 substantially parallel relating to a plane, containing respective tread circumference in a tread part central region 3 and its both side directional regions 4 over the total periphery of the tread part, further by providing directivity pattern respectively extended into a herringbone pattern from both side walls of the main peripheral groove 5 to arrange a plurality of oblique grooves 7, and the main peripheral groove 5 is formed by connecting broad and narrow width parts W1, W2 through a width gradually reduced part with a circumferential space in accordance with an arranging pitch of the oblique groove 7 and by connecting one end of the oblique groove 7 to this broad width part.

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L1: Entry 2 of 2

File: DWPI

Apr 19, 1994

DERWENT-ACC-NO: 1994-163687

DERWENT-WEEK: 199420

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TITLE: Pneumatic tyre to prevent hydro planing - has main and secondary circumferential grooves in tread centre shoulder areas the main groove having gradually-narrowed parts formed by alternating wide and narrow parts

PATENT-ASSIGNEE:

ASSIGNEE

CODE

BRIDGESTONE CORP

BRID

PRIORITY-DATA: 1992JP-0261789 (September 30, 1992)

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<input type="checkbox"/> <a href="#">JP 06106916 A</a>	April 19, 1994		005	B60C011/04

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 06106916A	September 30, 1992	1992JP-0261789	

INT-CL (IPC): B60C 11/04; B60C 11/11

ABSTRACTED-PUB-NO: JP 06106916A

BASIC-ABSTRACT:

A pneumatic tyre has a directional pattern in which a main circumferential groove and secondary circumferential grooves are arranged in the tread centre area and in both shoulder areas, while herringbone-shaped inclined grooves are arranged from both walls of the main circumferential groove.

The main circumferential groove is formed of wide and narrow sections which are joined by tapered sections and arranged by turns and at intervals of the pitch of the inclined grooves. One end of the inclined groove being connected to the wide section.

Pref. the ratio of the width of the narrow section (W1) to that of the wide section (W2) ranges from 0.4 to 0.9.

ADVANTAGE - The tyre can drain the incoming water backward and thus suppress the occurrence of hydro planing, while reducing noise.

CHOSEN-DRAWING: Dwg.1/4

TITLE-TERMS: PNEUMATIC TYRE PREVENT HYDRO PLANE MAIN SECONDARY CIRCUMFERENCE GROOVE  
TREAD CENTRE SHOULDER AREA MAIN GROOVE GRADUAL NARROW PART FORMING ALTERNATE WIDE  
NARROW PART

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:

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Q9212 ; K9416 ; B9999 B3974\*R B3963 B3930 B3838 B3747

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SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1994-074806

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B 6 0 C 11/04	D	8408-3D		
11/11	E	8408-3D		

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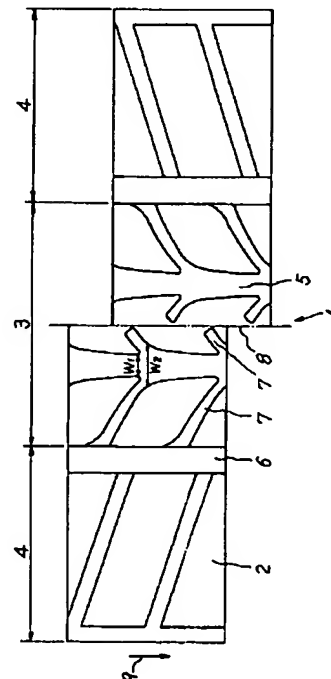
(74)代理人 弁理士 杉村 暁秀 (外5名)

(54)【発明の名称】 空気入りタイヤ

(57)【要約】

【目的】 本発明の目的は、ハイドロプレーニング現象の発生を抑制し、併せて騒音発生をも低減した空気入りタイヤを提供することにある。

【構成】 本発明の空気入りタイヤ1は、一対のサイドウォールと両サイドウォール間にまたがるトレッド部2がトロイド状に連なっている。トレッド部2は、その全周にわたりトレッド部中央域3およびその両側方域4にそれぞれトレッド円周を含む平面に対し実質上平行な主周溝5および副周溝6を備え、さらに主周溝5の両側壁からそれぞれ延び矢筈状となる複数の斜め溝7を配設した方向性パターンを有し、主周溝5が斜め溝7の配設ピッチに応じる円周間隔をおく広幅部 $W_2$ と狭幅部 $W_1$ とを漸減幅部を介し連ね、この広幅部に斜め溝7の一端を連通させてなることを特徴としている。



## 【特許請求の範囲】

【請求項1】 一對のサイドウォールと両サイドウォール間にまたがるトレッド部がトロイド状に連なり、トレッド部には、その全周にわたりトレッド部中央域およびその両側方域にそれぞれトレッド円周を含む平面に対し実質上平行な主周溝および副周溝を備え、さらに主周溝の両側壁からそれぞれ延び矢筈状となる複数の斜め溝を配設した方向性パターンを有する空気入りタイヤにおいて、主周溝を斜め溝の配設ピッチに応じる円周間隔をおく広幅部と狭幅部とを漸減幅部を介し連ね、この広幅部に斜め溝の一端を連通させてなることを特徴とする空気入りタイヤ。

【請求項2】 狭幅部 ( $W_1$ ) の広幅部 ( $W_2$ ) に対する溝幅の割合が0.4～0.9である請求項1記載の空気入りタイヤ。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、濡れた路面を走行する際の排水性を高め、ハイドロプレーニング現象の発生を抑制し、併せて乾燥路面での騒音発生をも少なくした方向性パターンを有する空気入りタイヤに関するものである。

## 【0002】

【従来の技術】 一般用空気入りタイヤは、その使用する種々の路面状態、例えば乾燥路面はもちろんのこと、濡れた路面等においても安定した性能を必要とする。この空気入りタイヤが濡れた路面を走行する場合は、環境・走行条件等によっては路面とタイヤ接地面との間に多量の水が侵入する。これらの間に存在する水膜が薄ければ、タイヤのトレッドに形成したトレッド溝の配設角度やタイヤの回転力の作用により、路面上の水膜を破壊することができ、この破壊した水膜の水は、タイヤ前方、側方および後方にスムーズに排出できるため、タイヤと路面の間の接地域は水膜に邪魔されることなく維持され、タイヤ接地面と路面との間の力の伝達は正常に行うことができる。

【0003】 しかし路面上の水膜が厚くなるにつれて、上記トレッド溝等により路面上の水膜を完全に破壊することができなくなり、この場合、タイヤ接地面内への水の侵入を余儀なくされる。このように接地面内に水が侵入したとしても、タイヤの側方や後方に速やかに排出して、タイヤが正常に路面と接地できれば問題ないが、タイヤの側方や後方への排水量よりも接地面内に侵入した水の量の方が多くなると、接地面内に水が停まるようになるので、タイヤが路面と直接接する面積は減少し、この面積が零となったときにタイヤが水面を滑っていく状態になり、いわゆるハイドロプレーニング現象が生じる。この現象が生じると、タイヤは地面と直接接することなく完全に水の上に乗ってしまい、その操縦性能を失う。この結果、事故につながることも多い。

【0004】 そこで、このハイドロプレーニング現象の発生を抑制する方法について種々の検討がなされている。この現象の発生を抑制するためには、タイヤが接地する路面上の水膜をいかにスムーズに除去できるかが重要となる。

【0005】 排水性向上を行ったものの代表例としては、方向性パターンを有するタイヤが挙げられる。このタイヤは、トレッド部に複数の横溝をトレッド部中央域から両側方域に向けてそれぞれ順次接地域に入るように傾斜させて配置したものであり(図4)、この溝配置により路面上に存在する水をタイヤの前方外側へ効果的に押し出すことができ、このため、タイヤ接地面内への水の侵入を防止できる結果、ハイドロプレーニング現象の発生が生じにくくなる。

## 【0006】

【発明が解決しようとする課題】 しかし、この方向性パターンを有するタイヤにおいても、路面上の水膜が厚くなるにつれて、タイヤ接地面内に多くの水が侵入するようになる。この侵入した水は、このタイヤ特有の溝形状により、トレッド部中央域に水が集まりやすい傾向にあるため、トレッド部中央域が水面上に浮き上がりやすく、続いて側方領域が浮き上がり、タイヤの接地面全体が水上に乗り上げたとき、ハイドロプレーニング現象が発生する。

【0007】 以上のことから、方向性パターンを有するタイヤの場合、タイヤ接地面と路面との間に侵入した水、特にトレッド部中央域に侵入した水を停滞させずに速やかに後方へ排除できるかどうか排水性の良否を左右する。

【0008】 そこで本発明は、方向性パターンを有する空気入りタイヤにおける排水性を高めること、具体的には、路面上に存在する水膜がかなり厚い場合において、タイヤ接地面内に侵入した水をタイヤ後方へ速やかに排除することによりハイドロプレーニング現象の発生を抑制することが課題である。また本発明は、乾燥路面の走行でタイヤ自体が発生する騒音性を低減することもできたので併せて後述する。

## 【0009】

【課題を解決するための手段】 本発明は、一對のサイドウォールと両サイドウォール間にまたがるトレッド部がトロイド状に連なり、トレッド部には、その全周にわたりトレッド部中央域およびその両側方域にそれぞれトレッド円周を含む平面に対し実質上平行な主周溝および副周溝を備え、さらに主周溝の両側壁からそれぞれ延び矢筈状となる複数の斜め溝を配設した方向性パターンを有する空気入りタイヤにおいて、主周溝を斜め溝の配設ピッチに応じる円周間隔をおく広幅部と狭幅部とを漸減幅部を介し連ね、この広幅部に斜め溝の一端を連通させてなることを特徴とする空気入りタイヤである。また、狭幅部  $W_1$  の広幅部  $W_2$  に対する溝幅の割合が0.4～

0.9であることがより好ましい。

【0010】本発明による空気入りタイヤの一例を図1に示し、図中1は空気入りタイヤ、2はトレッド部、3はトレッド部中央域、4はトレッド部側方域、5は主周溝、6は副周溝、7は斜め溝である。

【0011】本発明の空気入りタイヤ1は、一対のサイドウォールと両サイドウォール間にまたがるトレッド部2がトロイド状に連なっている。トレッド部2は、その全周にわたりトレッド部中央域3およびその両側方域4にそれぞれトレッド円周を含む平面に対し実質上平行な主周溝5および副周溝6を備え、さらに主周溝5の両側壁からそれぞれ延び矢筈状となる複数の斜め溝7を配設した方向性パターンを有している。

【0012】本発明は、主周溝5を斜め溝7の配設ピッチに応じる円周間隔をおく広幅部 $W_2$ と狭幅部 $W_1$ とを漸減幅部を介し連ね、この主周溝5の広幅部 $W_2$ には斜め溝7の一端を連通させてなることを特徴としている。

【0013】また、主周溝5の狭幅部 $W_1$ の広幅部 $W_2$ に対する割合が0.4~0.9の範囲であることがより好ましい。この割合が0.4未満だと、主周溝5に侵入した水を狭幅部で絞り過ぎるために後方排出を速やかに行えなくなり、0.9を超えると絞りとしての機能を果さなくなつてこの場合も速やかな後方排出が行えなくなるためである。

【0014】

【作用】ハイドロプレーニング現象は、空気入りタイヤの接地面内への水の侵入により発生するため、この排水性の良否が大きく影響すること、具体的に述べると、路面上の水膜が比較的厚い(10mm程度)場合、例えばタイヤの回転速度が増加するにつれて、タイヤの前方へ水を押し出してもタイヤ接地面内に多くの水が存在することになるので、このときのタイヤの後方への水の排除能力の良否がハイドロプレーニング現象の発生に大きく影響することはすでに前述した。ここでは、特に方向性パターンを有する従来タイヤと対比させながら発明タイヤの作用を説明する。なお、発明タイヤはトレッドパターンに特徴があり、他の構造については一般的な空気入りタイヤについて改変を要しないため踏襲できる。

【0015】方向性パターンを有する従来タイヤは、タイヤの前方へ水を押し出す能力(排水性)が非方向性パターンを有するタイヤに比べて優れている。しかし、タイヤの前方への水の押し出し能力が優れていても、路面上の水が多くなるとタイヤ接地面内に多くの水が存在するようになり、この場合、方向性パターン特有の溝配置により接地面内に水を呼び込みやすく、特にトレッド部側方域よりもその中央域の方に水が集まりやすくなる。この結果、タイヤ接地面内に侵入する水の量が増加するにつれて、まずトレッド部中央域が水上に乗り上げるようになり、次いでトレッド部側方域が乗り上げるようになり、タイヤが路面と直接接する面積が零となったと

き、ハイドロプレーニング現象が発生する。

【0016】そこで発明者は、タイヤ接地面内のトレッド部中央域に侵入する水、特に、主周溝に侵入した水および主周溝に連通する斜め溝に侵入した水を速やかにタイヤの後方へ排出することがハイドロプレーニング現象の発生を抑制することにつながると考えた。

【0017】そこで本発明タイヤは、トレッド部中央域3に侵入した水を速やかに排出するため、従来のトレッド部2の全周にわたって等幅で配設していた主周溝5を、斜め溝7の配設ピッチに応じる円周間隔をおく広幅部と狭幅部とを漸減幅部を介し連ねる構造とすることにより、タイヤ接地面内の主周溝5に侵入した水は、主周溝内の水圧の強弱、いわばポンプの作用により、タイヤの後方への排出速度を増して除去され、さらにこの広幅部に斜め溝7の一端を連通させることにより、この斜め溝7に侵入した水も、主周溝5との水圧の関係により主周溝5へ流れ込みやすくなり、この水も主周溝5の水と共にタイヤ後方へ排除されるのである。

【0018】このことから、本発明タイヤは、トレッド部中央域3に水が侵入したとしても速やかにその水をタイヤの後方へ排出できるため、ハイドロプレーニング現象の発生を抑制することが可能となった。

【0019】また、乾燥路面での走行では、タイヤ接地面内でのトレッド溝へ空気が流入し、この空気が急激に外に排出されると、吹き出し音と呼ばれる騒音を発生して問題になる。しかし、主周溝5が上記のように溝幅の広狭を周期的に繰り返した構造とすることにより、いわゆる消音器の効果が得られるので、騒音を低減する効果も得られる。

【0020】

【実施例】タイヤサイズが205/55R16で、ポリエステルコードのカーカスと三枚のベルト層(二枚のスチール層および一枚のナイロンキャップ層)を有する公知構造の供試タイヤを用いて排水性および騒音の試験を行った。

・ 供試タイヤ

供試タイヤは、図1に示す発明タイヤと図4に示す従来タイヤである。発明タイヤは、トレッド部2の主周溝5が斜め溝7の配設ピッチに応じる円周間隔をおく広幅部 $W_2$ と狭幅部 $W_1$ とを漸減幅部を介し連ね、斜め溝7を広幅部に連通させた構造となり、方向性パターンを有する。

【0021】主周溝5の狭幅部 $W_1$ と広幅部 $W_2$ の幅を、それぞれ8.5mm、14.5mmとした。この場合、 $W_1/W_2$ の比は0.59である。なお、 $W_1/W_2$ の比は0.4~0.9の範囲がより好ましい。

【0022】各主周溝5の溝幅の広狭をその溝両側壁をトレッド部幅方向に周期的に変化させて形成したが、本発明は主周溝5の断面積を周期的に変化させれば目的が達成できるので、主周溝5の片側壁のみを変化させても

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よく、その場合はトレッド部幅方向外側の側壁に形成することが好ましい(図2)。また主周溝5の側壁の形状は、曲線状が好ましいが、直線状でもよい。なお発明タイヤの代表例(図1～図3)に、いずれも赤道面に対して対称である方向性パターンについて示したが、非対称の方向性パターンの場合にも適用できる。

【0023】従来タイヤは、トレッド部2が一般的な方向性パターンで、主周溝5の溝幅が全周にわたって等幅である以外の構造は発明タイヤと同じである。

#### 【0024】・試験方法

排水性は、タイヤを実車に装着し、水深10mmの水を張った路面上を速度を徐々に増して走行した際に、ハイドロプレーニング現象が発生するまでの速度を測定することにより評価した。騒音は、表面が平滑な回転ドラム上を走行して、タイヤ騒音試験法(JASOC606)により、1.8kHzピーク付近のバンドパワー値を測定することにより評価した。表1に試験結果を示す。

#### 【0025】

【表1】

	実 施 例
排水性	4 %向上
騒音	-6 dB減

(従来例対比)

【0026】これらの試験結果から、本発明タイヤは従来タイヤに比べ、ハイドロプレーニング現象の発生が抑制されている。さらに、タイヤ自体が発生する騒音についても、低減する効果が認められる。

#### 【0027】

【発明の効果】本発明によれば、方向性パターンを有す

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るタイヤにおいて、その特徴であるタイヤ前方への水の押し出し排除の効果が薄らぐような路面上の水量が多い場合においても、トレッド部2の主周溝5を斜め溝7の配設ピッチに応じる円周間隔をおく広幅部 $W_2$ と狭幅部 $W_1$ とを漸減幅部を介し連ね、斜め溝7を広幅部に連通させた構造としたことで侵入した水をタイヤ後方へ速やかに排除でき、その結果、ハイドロプレーニング現象の発生を抑制することできる。またこの主周溝5は、乾燥路面では、消音効果を示す形状でもあるので騒音低減にも効果がある。

#### 【図面の簡単な説明】

【図1】実施例に供した発明タイヤのトレッド部を展開した主要部前面図である。

【図2】別の発明タイヤのトレッド部を展開した主要部前面図である。

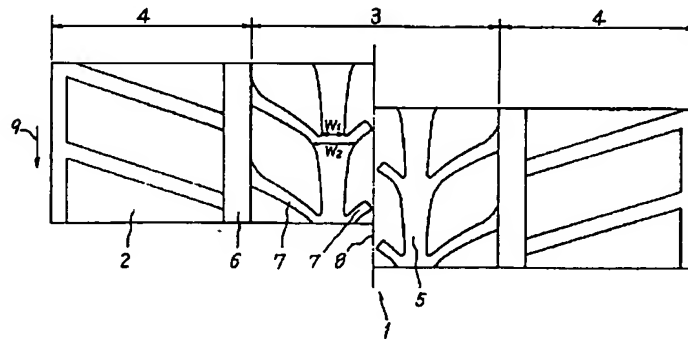
【図3】他の発明タイヤのトレッド部を展開した主要部前面図である。

【図4】従来タイヤのトレッド部を展開した主要部前面図である。

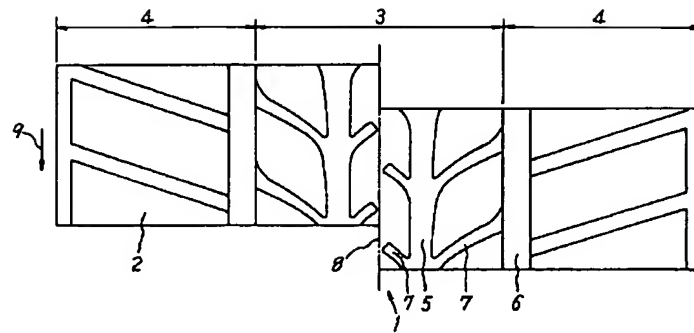
#### 20 【符号の説明】

- 1 空気入りタイヤ
- 2 トレッド部
- 3 トレッド部中央域
- 4 トレッド部側方域
- 5 主周溝
- 6 副周溝
- 7 斜め溝
- 8 中央周線
- 9 タイヤの回転方向
- 30  $W_1$  狭幅部
- $W_2$  広幅部

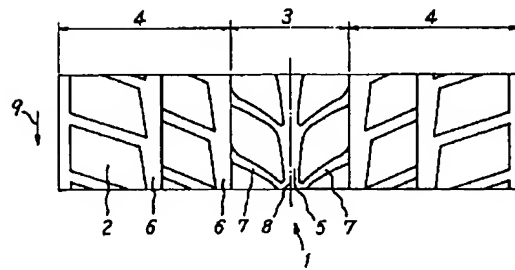
【図1】



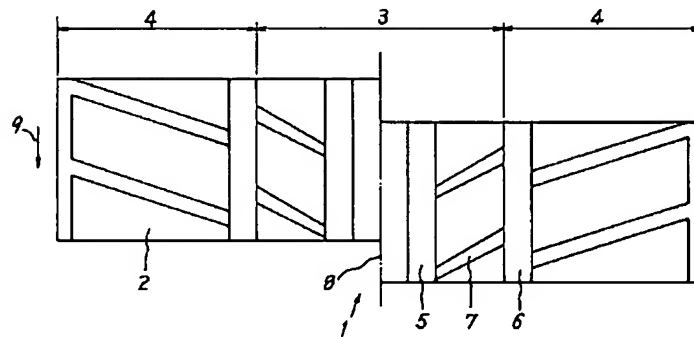
【図2】



【図3】



【図4】





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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention raises the wastewater nature at the time of running the wet road surface, and relates to the pneumatic tire which has the directivity pattern which controlled and combined generating of hydroplaning and also lessened noise generating on a desiccation road surface.

[0002]

[Description of the Prior Art] The pneumatic tire for general needs the engine performance stabilized also in the wet road surface etc. not to mention the road surface condition of the versatility to be used, for example, a desiccation road surface. When running the road surface on which this pneumatic tire was damp, a lot of water invades between a road surface and a tire ground plane according to an environment, transit conditions, etc. If the water screen which exists among these is thin, according to the operation of the turning effort of the arrangement include angle of a tread groove, or a tire formed in the tread of a tire Since the water screen on a road surface can be destroyed and the water of this destroyed water screen can be smoothly discharged to the tire front, the side, and back, the touch-down region between a tire and a road surface is maintained without being interfered by the water screen, and transfer of the force between a tire ground plane and a road surface can be performed normally.

[0003] However, it becomes impossible to destroy the water screen on a road surface completely by the above-mentioned tread groove etc., and is obliged to invasion of the water into a tire ground plane in this case as the water screen on a road surface becomes thick. Thus, even if water invades in a ground plane, it discharges promptly the side and behind a tire. Although a tire is satisfactory if it can ground with a road surface normally, if the amount of the water which invaded in the ground plane increases more than the displacement to the side and the back of a tire, since the stop [ water / come ] in a ground plane It decreases, when this area becomes zero, a tire will be in the condition of sliding on the water surface, and the so-called hydroplaning produces the area to which a tire touches a road surface directly. If this phenomenon arises, a tire will run aground on water completely, without touching the ground directly, and will lose that controllability ability. Consequently, it leads to accident in many cases.

[0004] Then, various examination is made about the approach of controlling generating of this hydroplaning. In order to control generating of this phenomenon, it becomes important how the water screen on the road surface which a tire grounds is smoothly removable.

[0005] Although the wastewater disposition top was performed, the tire which has a directivity pattern is mentioned as an example of representation. generating of hydroplaning stop easily being able to produce this tire , as a result of being able to make it able to incline so that two or more transverse grooves may be turn to the method region of both sides from a tread section central region at the tread section and it may go into a sequential touch-down region , respectively , being able to arrange ( drawing 4 ) , being able to extrude effectively the water which exist on a road surface by this slot arrangement to the front outside of a tire and being able to prevent invasion of the water into a tire ground plane for this reason .

[0006]

[Problem(s) to be Solved by the Invention] However, also in the tire which has this directivity pattern,

much water comes to invade in a tire ground plane as the water screen on a road surface becomes thick. According to the shape of a quirk peculiar to this tire, since this water that invaded has water in an assembly or a cone inclination in a tread section central region, when a tread section central region tends to come floating on the water surface, continues, a side field comes floating and the whole ground plane of a tire runs aground to Minakami, hydroplaning generates it.

[0007] In the case of the tire which has a directivity pattern, from the above thing, whether it can eliminate back promptly, without stagnating the water which invaded between the tire ground plane and the road surface, especially the water which trespassed upon the tread section central region influences the quality of wastewater nature.

[0008] Then, when raising the wastewater nature in the pneumatic tire which has a directivity pattern, and the water screen of this invention which exists on a road surface are specifically quite thick, it is a technical problem to control generating of hydroplaning by eliminating promptly the water which invaded in the tire ground plane to tire back. Moreover, since the noise nature which the tire itself generates to transit of a desiccation road surface was also reduced, this invention is mentioned later collectively.

[0009]

[Means for Solving the Problem] The tread section over between the sidewall of a pair and both sidewalls in this invention stands in a row in the shape of a toroid. In the tread section A tread section central region and its method region of both sides are equipped with the parallel main circumferential groove and a subcircumferential groove on parenchyma to the flat surface which includes a tread periphery, respectively over the perimeter. In the pneumatic tire which has the directivity pattern which arranged two or more slanting slots which furthermore serve as a stretch herringbone from the both-sides wall of the main circumferential groove, respectively It is the pneumatic tire characterized by putting in a row the double width section and the narrow-width section which set periphery

[ circumferential groove / main ] spacing according to the arrangement pitch of a slanting slot through gradual decrease \*\*\*\*, and making this double width section come to be open for free passage of the end of a slanting slot. Moreover, the narrow-width section W1 Double width section W2 It is more desirable that the rates of a flute width of receiving are 0.4-0.9.

[0010] an example of the pneumatic tire by this invention -- drawing 1 -- being shown -- one in drawing -- for a tread section central region and 4, as for the main circumferential groove and 6, a tread section side region and 5 are [ a pneumatic tire and 2 / the tread section and 3 / a subcircumferential groove and 7 ] slanting slots.

[0011] The tread section 2 over between the sidewall of a pair and both sidewalls in the pneumatic tire 1 of this invention stands in a row in the shape of a toroid. The tread section 2 is equipped with the parallel main circumferential groove 5 and the subcircumferential groove 6 on parenchyma to the flat surface which includes a tread periphery over the perimeter in the tread section central region 3 and its method region 4 of both sides, respectively, and has the directivity pattern which arranged two or more slanting slots 7 which serve as a stretch herringbone from the both-sides wall of the main circumferential groove 5 further, respectively.

[0012] the double width section W2 in which this invention sets periphery [ circumferential groove / 5 / main ] spacing according to the arrangement pitch of the slanting slot 7 The narrow-width section W2 gradual decrease \*\*\*\* -- minding -- putting it in a row -- the double width section W2 of this main circumferential groove 5 \*\*\*\* -- it is characterized by making it come to be open for free passage of the end of the slanting slot 7.

[0013] Moreover, the narrow-width section W1 of the main circumferential groove 5 Double width section W2 It is more desirable that the range of the rate of receiving is 0.4-0.9. If this rate is less than 0.4, in order to wring too much the water which invaded into the main circumferential groove 5 in the narrow-width section, when it becomes impossible to perform back discharge promptly and 0.9 is exceeded, it is because it stops achieving the function as a diaphragm and it becomes impossible to perform prompt back discharge also in this case.

[0014]

[Function] Since hydroplaning is generated by invasion of the water into the ground plane of a pneumatic tire, When it tells that the quality of this wastewater nature influences greatly, and a concrete target, when the water screen on a road surface is comparatively thick (about 10mm), For example, since much water would exist in a tire ground plane even if it extruded water ahead of the tire as the rotational speed of a tire increased, it already mentioned above that the quality of the exclusion capacity of the water to the back of the tire at this time influenced generating of hydroplaning greatly. An operation of an invention tire is explained especially here, making it contrast with a tire conventionally which has a directivity pattern. In addition, an invention tire has the description in a tread pattern, and since it does not require an alteration about the common pneumatic tire about other structures, it can be followed.

[0015] The tire is conventionally [ which has a directivity pattern ] excellent in the capacity (wastewater nature) which extrudes water ahead of a tire compared with the tire which has a non-directivity pattern. However, even if the knockout capacity of the water ahead of a tire is excellent, if the water on a road surface increases in number, much water comes to exist in a tire ground plane, and it is easy to call in water in a ground plane by slot arrangement peculiar to a directivity pattern in this case, and water assembly-comes to be easy from a tread section side region to the direction of that central region especially. Consequently, a tread section central region comes to run aground to Minakami first, subsequently a tread section side region comes to run aground, and when the area to which a tire touches a road surface directly becomes zero, hydroplaning occurs, as the amount of the water which invades in a tire ground plane increases.

[0016] Then, the artificer thought that it led to discharging promptly the water which trespassed upon the slanting slot which is open for free passage to the water which trespasses upon the tread section central region in a tire ground plane, the water which invaded into the main circumferential groove especially, and the main circumferential groove behind a tire controlling generating of hydroplaning.

[0017] Then, in order that this invention tire may discharge promptly the water which trespassed upon the tread section central region 3, By considering as the structure which puts in a row the double width section which sets periphery [ circumferential groove / 5 / which was being arranged with equal width over the perimeter of the conventional tread section 2 / main ] spacing according to the arrangement pitch of the slanting slot 7, and the narrow-width section through gradual decrease \*\*\*\* the water which invaded into the main circumferential groove 5 in a tire ground plane -- the strength of the water pressure in the main circumferential groove -- according to an operation of a pump so to speak By gathering the elimination rate to the back of a tire, being removed, and making this double width section open the end of the slanting slot 7 for free passage further The water which trespassed upon this slanting slot 7 also becomes easy to flow with the relation of water pressure with the main circumferential groove 5 into the main circumferential groove 5, and this water is also eliminated with the water of the main circumferential groove 5 to tire back.

[0018] Since this invention tire discharged the water behind a tire promptly even if water trespasses upon the tread section central region 3, it became possible [ controlling generating of hydroplaning ] from this.

[0019] Moreover, to transit on a desiccation road surface, if air flows into the tread groove in a tire ground plane and this air is discharged outside rapidly, the noise called a blowdown sound will be generated and it will become a problem. However, the effectiveness of the so-called effectiveness of a silencer being acquired and reducing the noise by \*\* is also acquired by considering as the structure in which the main circumferential groove 5 repeated extensive \*\* of a flute width periodically as mentioned above.

[0020]

[Example] By 205 / 55R16, tire size performed the trial of wastewater nature and the noise using the sample offering tire of the well-known structure of having the carcass of a polyester code, and the belt layer (the steel layer of two sheets, and nylon cap layer of one sheet) of three sheets.

- A sample offering tire sample offering tire is a tire conventionally which is shown in the invention tire shown in drawing 1 , and drawing 4 . An invention tire is the double width section W2 in which the main circumferential groove 5 of the tread section 2 sets periphery spacing according to the arrangement

pitch of the slanting slot 7. Narrow-width section W1 It is put in a row through gradual decrease \*\*\*\*, becomes the structure where the double width section was made to open the slanting slot 7 for free passage, and has a directivity pattern.

[0021] The narrow-width section W1 of the main circumferential groove 5 Double width section W2 Width of face was set to 8.5mm and 14.5mm, respectively. In this case, W1 / W2 A ratio is 0.59. In addition, W1 / W2 The range of a ratio of 0.4-0.9 is more desirable.

[0022] Although the slot both-sides wall was changed crosswise [ tread section ] periodically and extensive \*\* of the flute width of each main circumferential groove 5 was formed, since the purpose can attain this invention if the cross section of the main circumferential groove 5 is changed periodically, it is desirable to change only the single-sided wall of the main circumferential groove 5, and to form in the side attachment wall of a tread section cross direction outside in that case ( drawing 2 ). Moreover, although the configuration of the side attachment wall of the main circumferential groove 5 has the desirable shape of a curve, a straight line-like is sufficient as it. In addition, also in the case of an unsymmetrical directivity pattern, it is applicable although each was shown in the example of representation of an invention tire ( drawing 1 - drawing 3 ) about the symmetrical directivity pattern to the equatorial plane.

[0023] A tire is a directivity pattern with the common tread section 2, and the structure except the flute width of the main circumferential groove 5 being equal width over the perimeter is conventionally the same as an invention tire.

[0024] - Test-method wastewater nature equipped the real vehicle with the tire, and when it gathered a rate gradually and ran the road surface top which filled water with a depth of 10mm, it evaluated it by measuring a rate until hydroplaning occurs. The noise ran the rotating-drum top with a smooth front face, and evaluated it by the tire noise-test method (JASOC606) by measuring the band power value near a 1.8kHz peak. A test result is shown in Table 1.

[0025]

[Table 1]

	実 施 例
排水性	4 %向上
騒音	-6 d B減

(従来例対比)

[0026] From these test results, as for this invention tire, generating of hydroplaning is conventionally controlled compared with the tire. Furthermore, the effectiveness to reduce is accepted also about the noise which the tire itself generates.

[0027]

[Effect of the Invention] [ when there is much amount of water on a road surface on which the effectiveness of knockout exclusion of the water to the tire front which is the description diminishes in the tire which has a directivity pattern according to this invention ] The double width section W2 which sets periphery [ circumferential groove / 5 / of the tread section 2 / main ] spacing according to the arrangement pitch of the slanting slot 7 Narrow-width section W1 It is put in a row through gradual decrease \*\*\*\*. The water which invaded by having considered as the structure where the double width section was made to open the slanting slot 7 for free passage can be promptly eliminated to tire back, consequently generating of hydroplaning is controlled and the thing of it can be carried out. Moreover, on a desiccation road surface, since this main circumferential groove 5 is also the configuration which shows a silencing effect, there is effectiveness also in a noise reduction.

[Translation done.]

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CLAIMS

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[Claim(s)]

[Claim 1] The tread section over between the sidewall of a pair and both sidewalls stands in a row in the shape of a toroid. In the tread section A tread section central region and its method region of both sides are equipped with the parallel main circumferential groove and a subcircumferential groove on parenchyma to the flat surface which includes a tread periphery, respectively over the perimeter. In the pneumatic tire which has the directivity pattern which arranged two or more slanting slots which furthermore serve as a stretch herringbone from the both-sides wall of the main circumferential groove, respectively The pneumatic tire characterized by putting in a row the double width section and the narrow-width section which set periphery [ circumferential groove / main ] spacing according to the arrangement pitch of a slanting slot through gradual decrease \*\*\*\*, and making this double width section come to be open for free passage of the end of a slanting slot.

[Claim 2] The pneumatic tire according to claim 1 whose rates of a flute width to the double width section (W2) of the narrow-width section (W1) are 0.4-0.9.

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[Translation done.]